Cambridge International AS & A Level

Cambridge Assessment International Education
Cambridge International Advanced Subsidiary and Advanced Level

BIOLOGY **9700/11**

Paper 1 Multiple Choice **October/November 2019**

1 hour

Additional Materials: Multiple Choice Answer Sheet
Soft clean eraser
Soft pencil (type B or HB is recommended)

7089765144

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.
Do not use staples, paper clips, glue or correction fluid.
Write your name, centre number and candidate number on the Answer Sheet in the spaces provided unless this has been done for you.
DO **NOT** WRITE IN ANY BARCODES.

There are **forty** questions on this paper. Answer **all** questions. For each question there are four possible answers **A**, **B**, **C** and **D**.
Choose the **one** you consider correct and record your choice in **soft pencil** on the separate Answer Sheet.

Read the instructions on the Answer Sheet very carefully.

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.
Any rough working should be done in this booklet.
Electronic calculators may be used.

This document consists of **17** printed pages and **3** blank pages.

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1 Which cell structure contains cytoplasm?

A chloroplasts

B mitochondria

C plasmodesmata

D smooth endoplasmic reticulum

2 Some cell structures are listed in a particular order.

1 nucleus

2 ribosome

3 Golgi body

4 vesicle

What determines the order in which these cell structures are listed?

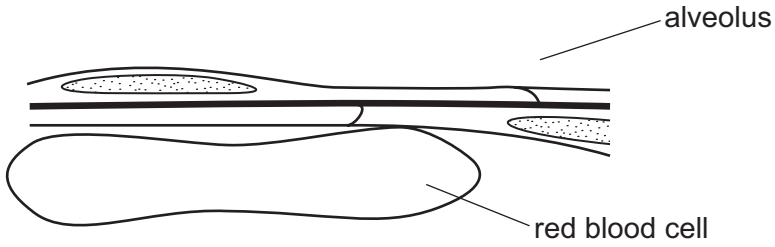
A sequence used in synthesis of a lipid

B sequence used in synthesis of an antibody

C size from largest to smallest

D size from smallest to largest

3 The drawing has been made from a section showing part of an alveolus and a red blood cell in a capillary. The magnification of the drawing is ×5000.



What is the minimum distance that oxygen must diffuse from air in an alveolus into the red blood cell?

A 0.1 nm **B** 1.0 nm **C** 0.1 μm **D** 1.0 μm

4 Four students were asked to match the function with the appearance of some cell structures in an animal cell.

The functions were listed by a number.

1 mRNA passes through to the ribosome

2 synthesis of polypeptides

3 packaging of hydrolytic enzymes that will remain in the cell

The appearances were listed by a letter.

V membranes which surround an enclosed inner cavity

W non-membrane bound, spherical structures

X a double membrane interspersed with pores

Y non-membrane bound, cylindrical structures

Z membrane-bound sacs, arranged as a flattened stack

Which student correctly matched the numbered functions with the appearance of the cell structure?

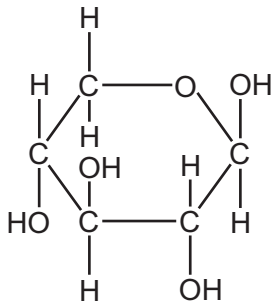
	1	2	3
A	V	X	Y
B	V	Z	Z
C	X	W	Z
D	X	Z	W

5 The antibiotic chloramphenicol inhibits protein synthesis in mitochondria and in some prokaryotes. Chloramphenicol does **not** inhibit protein synthesis in the cytoplasm of eukaryotic cells.

What would be the effect on the cells of a person being treated with chloramphenicol?

	rate of ATP production	transcription of nuclear DNA
A	decreases	decreases
B	decreases	no effect
C	increases	decreases
D	no effect	no effect

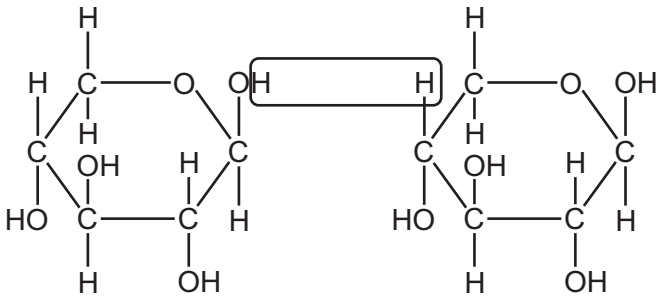
6 The diagram shows the monosaccharide xylose.



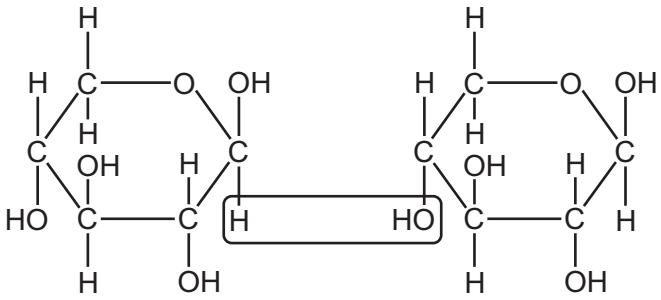
Many xylose monomers can be joined by glycosidic bonds to form a polysaccharide which is found in plant cell walls.

Which diagram shows the formation of a glycosidic bond between two xylose monomers?

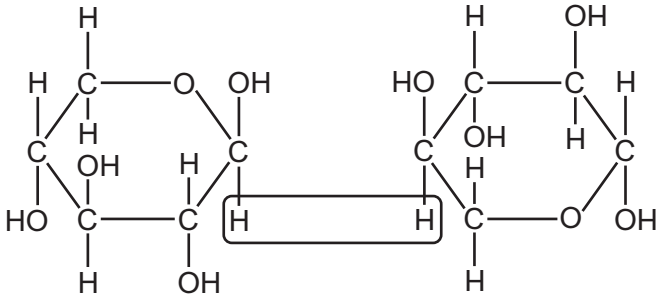
A



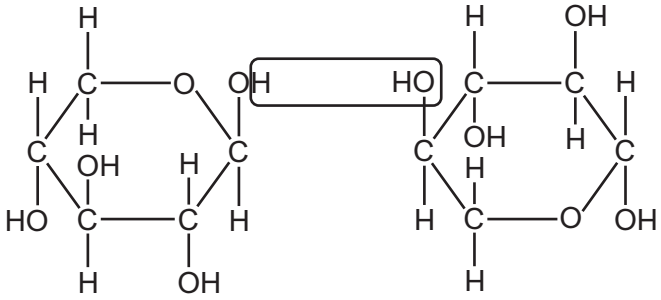
B



C



D



7 Which colour indicates the lowest concentration of reducing sugar present in a solution after testing with Benedict's solution?

A brown

B green

C red

D yellow

8 Which molecules are monomers?

1 ribose

2 glucose

3 deoxyribose

4 sucrose

A 1, 2 and 3 **B** 1, 2 and 4 **C** 1, 3 and 4 **D** 2, 3 and 4

9 Which molecules have properties that are dependent on hydrogen bonds?

1 cellulose

2 glycogen

3 haemoglobin

4 water

A 1, 2 and 3 **B** 1, 2 and 4 **C** 1, 3 and 4 **D** 2, 3 and 4

10 Some features of triglycerides are listed.

1 can be liquid or solid at room temperature

2 contains a high proportion of carbon–hydrogen bonds

3 insoluble in water

4 less dense than water

Which of these features make triglycerides suitable energy stores?

A 1 and 2 **B** 1 and 4 **C** 2, 3 and 4 **D** 2 and 3 only

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11 Some foods contain hydrogenated vegetable oils. These are unsaturated fats that have been converted to saturated fats.

Which property of the fats will have changed?

A Their hydrocarbon chains will fit together more closely.

B Their solubility in water will increase.

C They will have more double bonds in their molecules.

D They will remain liquid at room temperature.

12 Which statements could be used to describe enzyme molecules **and** antibody molecules?

1 Hydrogen bonds stabilise the structure of the protein and are important for it to function efficiently.

2 Hydrophilic R-groups point in to the centre of the molecule and cause it to curl into a spherical shape.

3 The tertiary structure of the protein molecule plays an important role in the functioning of the protein.

A 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

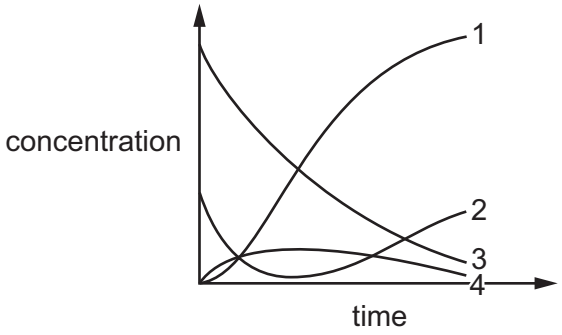
13 The V_{max} and K_m are determined for an enzyme-catalysed reaction.

What will be the effects on the V_{max} and K_m in the presence of a competitive inhibitor?

	V_{max}	K_m
A	decreases	increases
B	increases	decreases
C	stays the same	decreases
D	stays the same	increases

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14 The graph shows how the concentration of components,1, 2, 3 and 4, of an enzyme-catalysed reaction changes with time.



Which row identifies the components of this reaction?

	component 1	component 2	component 3	component 4
A	enzyme–substrate complex	unbound enzyme	product	substrate
B	enzyme–substrate complex	product	substrate	unbound enzyme
C	product	enzyme–substrate complex	unbound enzyme	substrate
D	product	unbound enzyme	substrate	enzyme–substrate complex

15 Which statement suggests that a membrane protein is involved in active transport?

A It allows movement of molecules across a membrane if concentration differences exist.

B It can only function if mitochondria are supplied with sufficient oxygen.

C It has a tertiary structure with a binding site with a specific shape.

D It is found in the cell surface membranes and the mitochondrial membranes.

16 Cell surface receptors used in cell signalling are usually proteins that extend from one side of the membrane to the other side of the membrane.

What is the role of the extracellular part of the protein?

A binding the signalling molecule

B functioning as an enzyme

C increasing the solubility of the receptor

D transmitting the signal from the target cell

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17 Which substances can pass directly through cell surface membranes and do **not** use a carrier protein or channel protein?

1 K^+ and Cl^-

2 CO_2

3 $C_6H_{12}O_6$

A 1 and 2 **B** 1 and 3 **C** 2 and 3 **D** 2 only

18 A student put a layer of plant epidermal cells on a microscope slide. The student put a drop of potassium nitrate solution on the layer of cells and observed that:

- the cell surface membrane of many of the cells had separated from the cell wall
- the cytoplasm and cell contents had shrunk.

What explains these observations?

	direction of net water movement	water potential of cells at start / kPa	water potential of solution at start / kPa
A	cells to solution	–100	–500
B	cells to solution	–500	–100
C	solution to cells	–100	–500
D	solution to cells	–500	–100

19 The enzyme telomerase prevents loss of telomeres after many mitotic cell cycles.

Which cells transcribe a high concentration of telomerase?

1 neutrophils

2 mature red blood cells

3 activated memory T-lymphocytes

A 1 and 2 **B** 1 and 3 only **C** 1 only **D** 3 only

20 At which stage of mitosis do these events occur?

	centromeres separate	chromosomes become shorter and thicker
A	anaphase	interphase
B	anaphase	prophase
C	metaphase	interphase
D	metaphase	prophase

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21 Which components could be found in nucleotides of rRNA?

1 any one of two different nitrogenous bases with a double ring structure

2 any one of two different purine bases

3 any one of three different nitrogenous bases with a single ring structure

4 any one of three different pyrimidine bases

A 1, 2, 3 and 4 **B** 1 and 2 only **C** 1 and 4 only **D** 3 and 4 only

22 How many statements are true for semi-conservative replication of DNA in a prokaryotic cell?

1 the process takes place in the cytoplasm

2 an adenine nucleotide will line up against a uracil on the template strand

3 each new DNA molecule will contain one strand from the parent molecule

4 if the parent molecule contained 40% guanine nucleotides each new DNA molecule will contain 20% guanine nucleotides

A 1 **B** 2 **C** 3 **D** 4

23 Sickle cell anaemia is caused by a mutation in an allele of the gene that codes for the β-globin polypeptide of haemoglobin.

The diagram shows the sequence of bases in a small section of the coding strand of DNA for both the Hb^A (normal) and Hb^S (sickle cell) β-globin alleles.

Hb^A CTGACTCCTGAGGAGAAGTCT

Hb^S CTGACTCCTGTGGAGAAGTCT

How will the mutation in the allele result in the production of an altered version of the β-globin polypeptide?

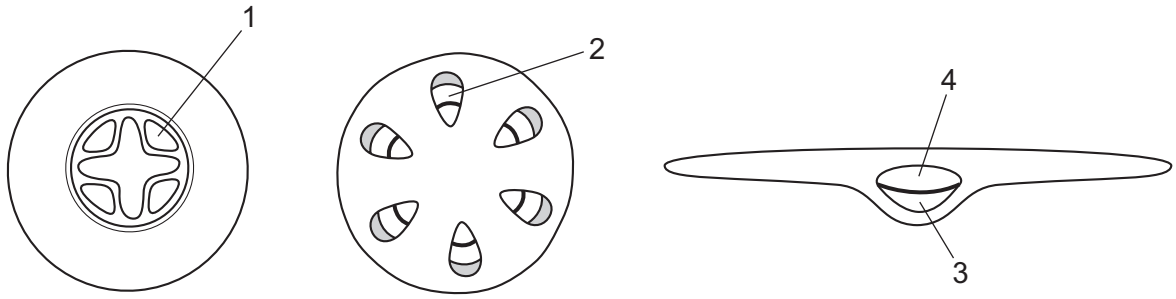
A A tRNA molecule with the anticodon GUG will hydrogen bond to the altered codon on mRNA.

B All the amino acids coded for after the mutation will differ from those in the Hb^A protein.

C mRNA transcribed from the Hb^S allele will contain the codon CAC instead of the codon CTC.

D The ribosome will be unable to continue translation of the Hb^S mRNA after the altered codon.

24 The diagrams show some tissue types in plant organs.



Which row identifies the tissue types?

	1	2	3	4
A	phloem	phloem	phloem	xylem
B	phloem	xylem	phloem	xylem
C	xylem	phloem	xylem	phloem
D	xylem	xylem	phloem	xylem

25 Which row correctly describes the adaptations of companion cells, phloem sieve tube elements and xylem vessel elements for their roles?

	companion cell	phloem sieve tube element	xylem vessel element
A	a thin layer of cytoplasm to reduce resistance to flow	strong, lignified cell walls for supporting the plant	many plasmodesmata for communication between cells
B	empty cells allowing water to flow freely	many plasmodesmata for communication between cells	strong, lignified cell walls for supporting the plant
C	many plasmodesmata for communication between cells	a thin layer of cytoplasm to reduce resistance to flow	empty cells allowing water to flow freely
D	strong, lignified cell walls for supporting the plant	empty cells allowing water to flow freely	a thin layer of cytoplasm to reduce resistance to flow

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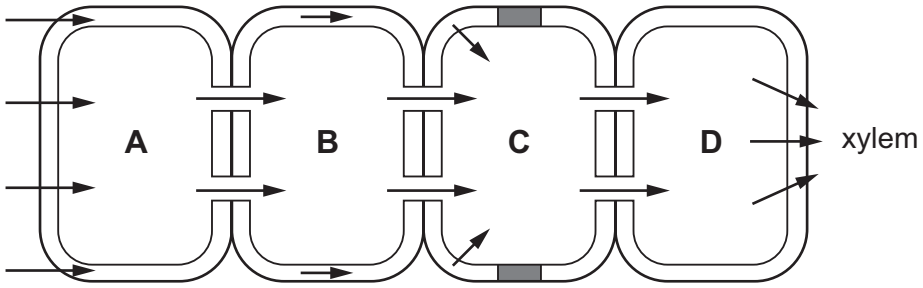
26 Irrigating crop plants with water containing low concentrations of salt causes an increase in the concentration of salt in the soil.

What explains why the increase in salt concentration could eventually kill the crop?

	water potential in roots	water potential in soil	direction of water movement
A	decreases		out of the roots
B	increases		into the roots
C		decreases	out of the roots
D		increases	into the roots

27 The diagram shows the pathway of water across root cells to the xylem.

Which cell is in the endodermis?



28 Which row shows the cause of mass flow in the phloem and the direction of movement of phloem sap by mass flow?

	cause of mass flow in the phloem	direction of movement of phloem sap by mass flow
A	hydrostatic pressure gradient	sink to source
B	hydrostatic pressure gradient	source to sink
C	water potential gradient	sink to source
D	water potential gradient	source to sink

29 Which statement about oxygen combining with haemoglobin is correct?

A All oxygen molecules which combine stop the haemoglobin molecule changing shape.

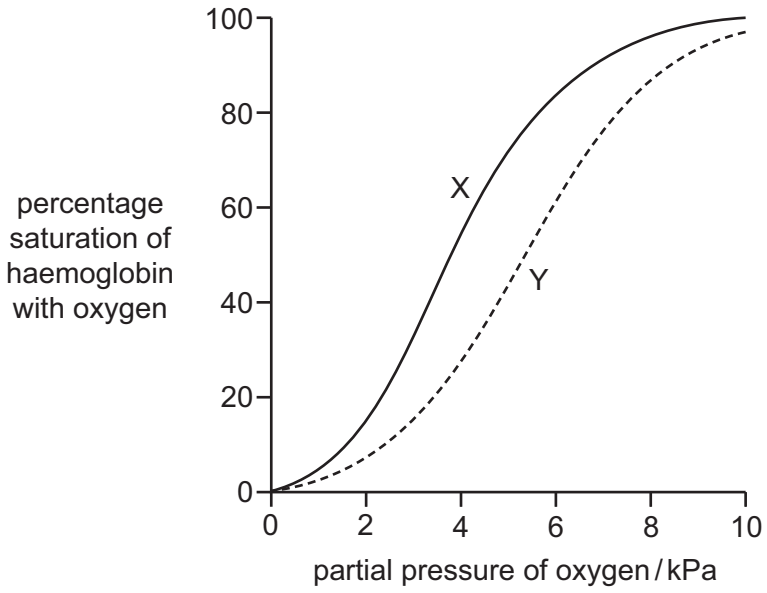
B Four oxygen molecules can combine with each haem group.

C The first oxygen molecule to combine does not affect the shape of haemoglobin.

D The second oxygen molecule to combine makes it easier for the third to combine.

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30 The diagram shows the Bohr effect.



What causes the shift from X to Y?

A decreased concentration of carbon dioxide and high pH

B decreased concentration of carbon dioxide and low pH

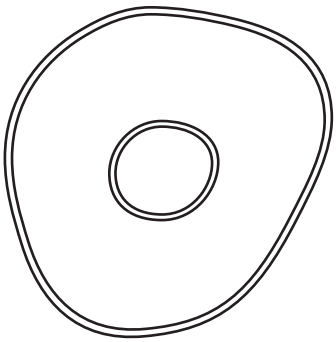
C increased concentration of carbon dioxide and high pH

D increased concentration of carbon dioxide and low pH

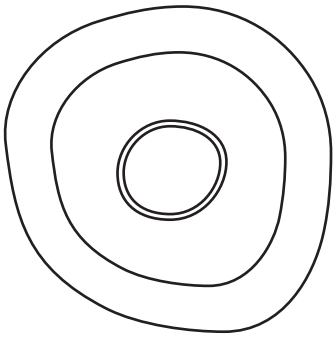
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31 Which plan diagram represents the tissues in a major vein?

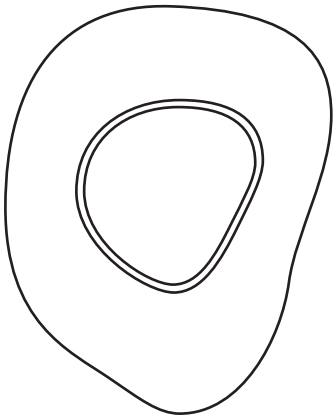
A



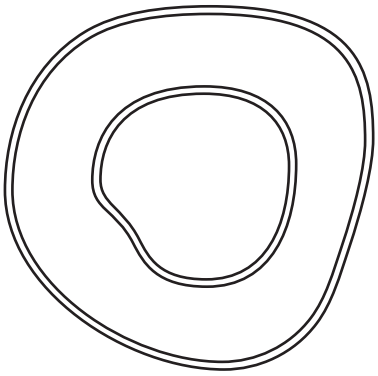
B



C



D



32 Ventricular septal defect (VSD) is a heart defect that people can have from birth. People with VSD have a hole in the wall (septum) that separates the left and right ventricles.

What could happen in a person with VSD?

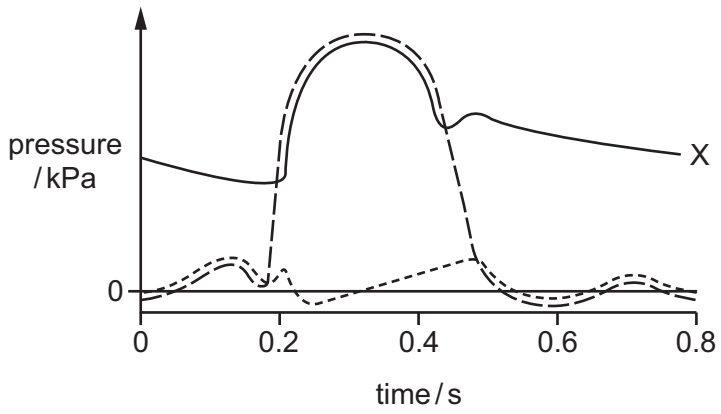
1 Blood will leak through the hole, mostly from right to left.

2 The volume of blood circulating through the lungs will be higher than in a person without VSD.

3 Less oxygen will be delivered to the body tissues.

A 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

33 The diagram shows the pressure changes in some structures of the **right side** of the heart during the cardiac cycle.



Which structure is represented by X?

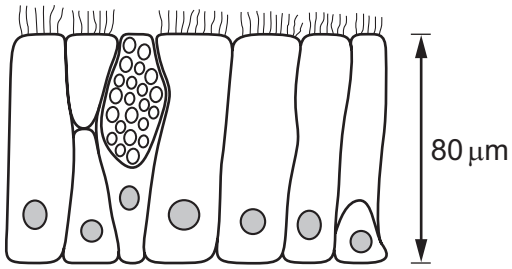
A pulmonary artery

B right atrium

C right ventricle

D vena cava

34 The diagram shows a section through a type of epithelium.



Where is this type of epithelium found in the respiratory system?

	trachea	bronchus	all bronchioles
A	✓	✓	✓
B	✓	✓	✗
C	✓	✗	✓
D	✗	✓	✓

key

✓ = present

✗ = not present

35 In chronic obstructive pulmonary disease (COPD), airflow through the airways is reduced.

Which statements explain the reduced airflow?

1 More mucus is secreted into the airways.

2 Airways and alveoli lose their elasticity.

3 Many of the alveoli are destroyed.

4 Carbon monoxide binds irreversibly to haemoglobin.

A 1, 2, 3 and 4

B 1, 2 and 3 only

C 1, 3 and 4 only

D 2, 3 and 4 only

36 Outbreaks of cholera commonly occur in refugee camps that are set up after a major natural disaster such as earthquakes.

The list shows some measures that can be taken to limit the spread of cholera in the refugee camps.

1 treating all drinking water supplies with a high concentration of chlorine

2 setting up an emergency treatment centre to isolate cases of cholera and treat them with antibiotics

3 using concentrated disinfectant to clean sewage disposal areas and infected bedding

4 health workers visiting regularly to detect cases

5 keeping good records of the number of cases and deaths at treatment centres

Which features of these control measures involve an economic factor?

A 1, 2, 3, 4 and 5

B 1, 3 and 5 only

C 2, 3, 4 and 5 only

D 2 and 4 only

37 Which use of antibiotics helps to reduce the spread of resistance in bacteria?

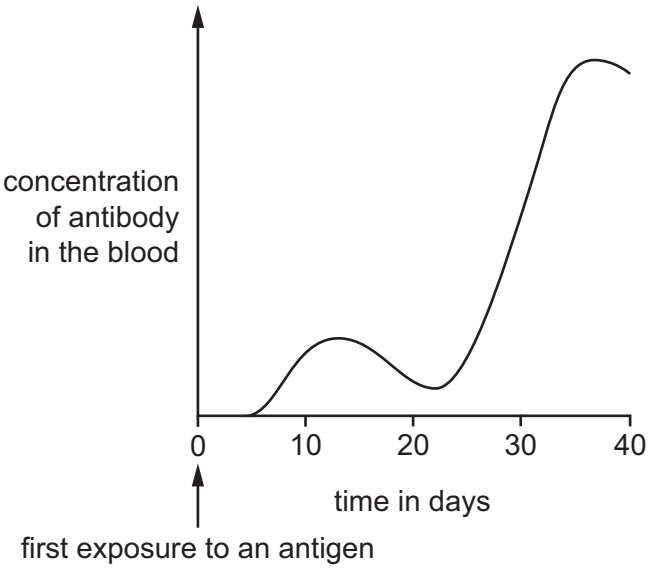
A using high concentrations of the antibiotic to kill all the bacteria

B giving routine preventative antibiotics to people who are having an operation

C regularly changing the type of antibiotic used to treat particular bacterial infections

D giving antibiotics to treat low level infection caused by a bacterium

38 The graph shows the amount of antibody produced in response to an antigen.



From the graph, which statement is correct?

A It takes 25 days to achieve active immunity.

B Memory cells for this antigen are present in the body within 20 days.

C T-helper lymphocytes are activated on day 12.

D The second exposure to the antigen occurred on day 25.

39 Which sequence summarises the hybridoma method for the production of monoclonal antibodies?

A	**B**	**C**	**D**
inject mammal with antibodies	inject mammal with antibodies	inject mammal with antigens	inject mammal with antigens
↓	↓	↓	↓
harvest antibodies from blood	harvest B-lymphocytes from spleen	harvest antibodies from blood	harvest B-lymphocytes from spleen
↓	↓	↓	↓
test for wanted antibody	fuse with cancer cells	test for wanted antibody	fuse with cancer cells
↓	↓	↓	↓
fuse with cancer cells	test for wanted antibody	fuse with cancer cells	test for wanted antibody
↓	↓	↓	↓
large scale culture	large scale culture	large scale culture	large scale culture

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40 The vaccination programme for smallpox was a medical success story which resulted in the World Health Organisation finally declaring the world free from smallpox in 1980.

Which statement correctly identifies the reasons for the success of the smallpox vaccination programme?

A The virus also infected animals making it easy to stop the transmission cycle.

B The virus remained in the body following infection and could become active later.

C The virus was stable and not prone to mutations.

D The virus was unstable and prone to mutations.

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